

Ocular tentacle malformation in *Deroceras reticulatum* (Mollusca: Gastropoda: Agriolimacidae)

Eduardo Daniel Daglio^{1,3}; Micaela de Lucía^{1,4}; David Gwyn Robinson² & Diego Eduardo Gutiérrez Gregoric^{1,5}

¹ Universidad Nacional de La Plata (UNLP), Facultad de Ciencias Naturales y Museo (FCNyM), División Zoología Invertebrados. La Plata, Buenos Aires, Argentina.

² United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), National Malacological Laboratory, Academy of Natural Sciences. Philadelphia, Pennsylvania, United States.

ORCID: <http://orcid.org/0000-0002-3481-3814>. E-mail: David.G.Robinson@aphis.usda.gov

³ ORCID: <http://orcid.org/0000-0001-7802-8650>. E-mail: dagliodaniel@gmail.com

⁴ Comisión de Investigaciones Científicas de la provincia de Buenos Aires (CIC).

ORCID: <http://orcid.org/0000-0002-8153-2716>. E-mail: mec_dl@hotmail.com

⁵ Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET).

ORCID: <http://orcid.org/0000-0002-8001-1062>. E-mail: dieguty@fcnym.unlp.edu.ar (corresponding author).

Abstract. Malformations in animals have long been known. In gastropod, natural and induced malformations are mentioned in different systems and in ocular tentacles, mainly linked to cases of parasitism and exposure to pollutants (molluscicides and chemicals). In this study we present a new malformation not documented in the ocular tentacles of slug *Deroceras reticulatum* that could be due to the action of pesticides. This malformation in *D. reticulatum* is the first malformation to be mentioned for South America in nursery gardens.

Key-Words. Anomalies; Nursery gardens; Pesticides; Slugs.

INTRODUCTION

Malformations in animals have been cited in several cases, particularly in gastropod molluscs, mainly linked to cases of parasitism and exposure to pollutants (molluscicides and chemicals). These malformations can affect their reproductive system, mantle, foot or ocular tentacles (Simroth, 1905; Boettger, 1956; Wiktorowa, 1962; Jackiewicz *et al.*, 1998; Barroso *et al.*, 2000; Lahbib *et al.*, 2008; Sawasdee & Kohler, 2009; El Ayari *et al.*, 2018). The abnormal variations developed in the tentacles of gastropods are remarkable, and occur under both natural and experimental conditions. Among the natural anomalies observed are: a simple tentacle with a central cephalic position (Wächtler, 1929; Chetail, 1958; Jackiewicz, 1969), two tentacles arising from the same base (Techow, 1910; Hofmann, 1912), partially fused tentacles located in the center of the head (Römer, 1903) or bifurcated tentacles (Jackiewicz, 1969; Jackiewicz *et al.*, 1998). Other anomalies present in tentacles have been induced experimentally by the amputation of the tentacle (Techow, 1910; Hofmann 1912). Among the species where tentacular malforma-

tions and their subsequent regeneration had been observed, the following can be mentioned: marine gastropods: *Stramonita haemastoma* (Linnaeus, 1767), *Strombus pugilis* Linnaeus, 1758, *Conomurex luhuanus* (Linnaeus, 1758); freshwater gastropods: *Planorbis corneus* (Linnaeus, 1758), *Lymnaea stagnalis* (Linnaeus, 1758); and terrestrial gastropods: *Arion subfuscus* (Draparnaud, 1805), *Deroceras laeve* (Müller, 1774), *Helix pomatia* Linnaeus, 1758, *Cornu aspersum* (Müller, 1774), and *Cepaea hortensis* (Müller, 1774).

Despite of the existence of several anomalies all over the globe, in South America, more precisely in Argentina, references about the presence of malformations in terrestrial molluscs are scarce, associating them to studies on molluscicides (Clemente *et al.*, 2008), in which under laboratory conditions the lethality and the impossibility of reproducing are proved as consequences of these agents.

In the framework of identifying pathways of dispersion of invasive slugs in commercial nursery gardens in Buenos Aires province (Argentina), we present the first report of ocular tentacle malformation for *Deroceras reticulatum* (Müller, 1774).

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MATERIAL AND METHODS

Sampling was carried out during the month of November 2016 in four commercial nursery gardens located in the district of San Pedro (33°41'29"S, 59°40'36"W), Buenos Aires province, Argentina. The molluscs were obtained by manual collection, in natural areas, in plantations

and "pots". The molluscs collected were photographed while living in their environment and then relaxed in menthol solution for one day, to be later preserved in alcohol, and deposited in the Malacological Collection at the La Plata Museum of the La Plata National University, Buenos Aires Province, Argentina (MLP-Ma). Determination of the specimens was based on Barker (1999).

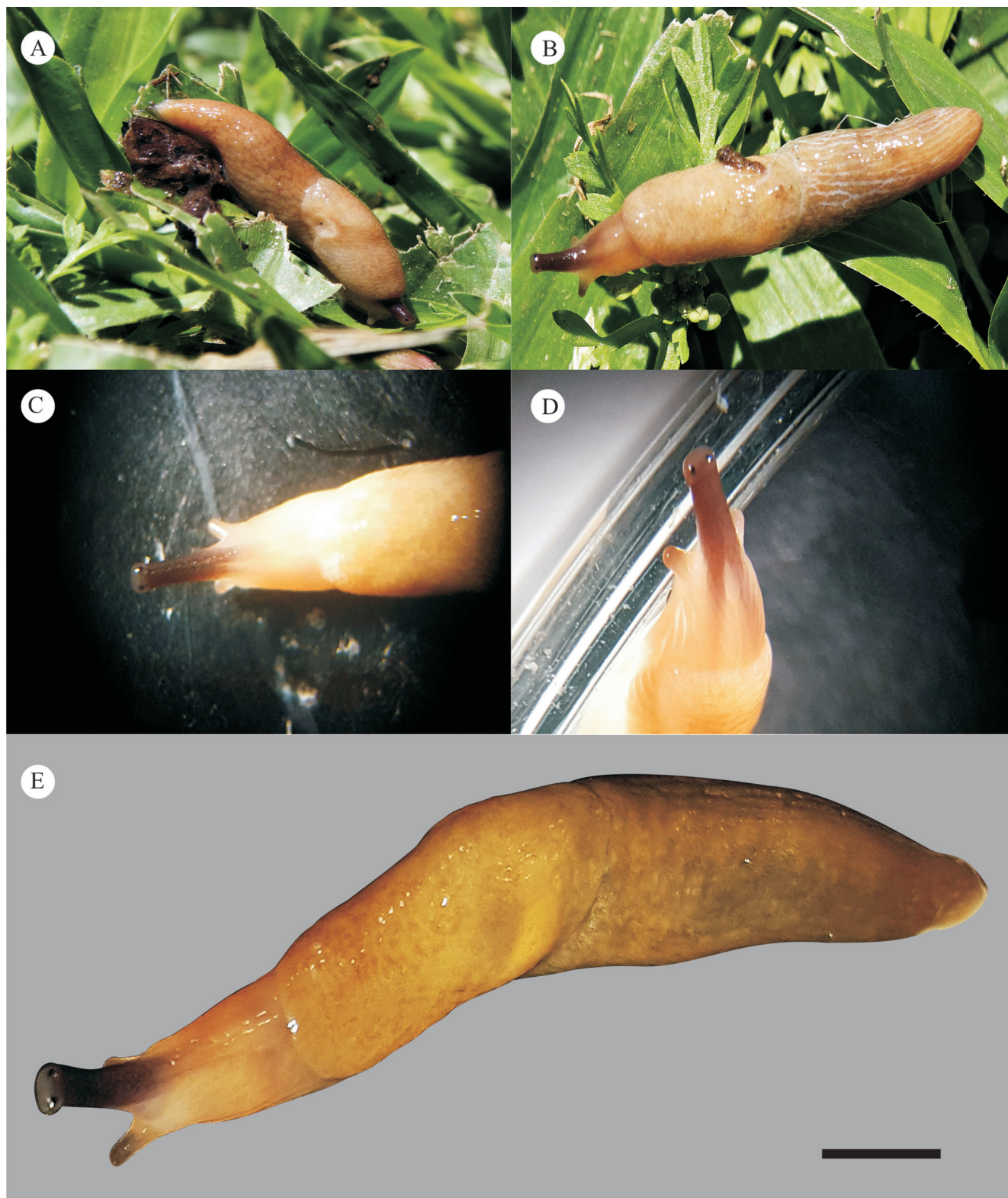


Figure 1. *Deroceras reticulatum* in life. Right side view (A); dorsal view (B); detail of the ocular tentacles (C-D); left side view (E). Scale bar: 2 mm.

RESULTS AND DISCUSSION

The sampling resulted in 77 molluscs collected, 35 are native slugs of the family Veronicellidae and 42 are exotic slugs of the family Agriolimacidae. Between the exotic slugs, 41 belong to *Deroceras laeve* and 1 to *Deroceras reticulatum* (MLP-Ma 14550). The origin of *Deroceras reticulatum* is believed to be Europe (Wiktor, 1996) and currently has a worldwide distribution and is a pest for some plant species as well as vector of various harmful parasitic organisms for both humans and other animals (Berg, 1997).

This specimen of *D. reticulatum* (total length 24 mm, Fig. 1) has a malformation, in which the ocular tentacles are fused along their entire length, giving the appearance of presenting a single ocular tentacle. The fusion takes place only between the body walls, whereas the two ocular nerve cords run separately, within the same tentacular structure, so that ocular sensors are situated side by side (Fig. 1).

The malformation observed in *D. reticulatum* of San Pedro is not the most common type, since amputations, bifurcations or partial fusions of the tentacles are usually detected as mentioned above (Römer, 1903; Wächtler, 1929; Chetail, 1958; Jackiewicz, 1969; El Ayari et al., 2018). Although only one individual with this malformation was registered, it is important to document their registration, which is the first to be mentioned in South America. This specimen was found inside a commercial nursery, this being the first record of malformation in this type of anthropogenic environment. Which could indicate that its malformation was related to pesticides used to keep crops and ornamental plants free of pests. We will continue to sample these sites to evaluate if more specimens with malformations are found.

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